

THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

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NEW EVIDENCE THAT CHEMISTS CAN TRANSMUTE ELEMENTS

Elements can actually be transmuted and one metal can be converted into another. This seems to be demonstrated by experiments reported to the British scientific journal, "Nature", by Dr. Arthur Smits and Dr. A. Karssen, of the University of Amsterdam. Base lead has, under the influence of electric current in a quartz lamp, been changed into mercury and perhaps into thallium, according to the claims of these two scientists.

The Dutch experiments tend to support the claims of Prof. A. Miethe of the University of Berlin and Prof. Hantaro Nagaoka, of the Tokyo Imperial University, that they have changed mercury into gold. When their claims were first made, many scientists doubted that such a change could be effected without the use of vast amounts of energy, far more than any of these modern alchemists have used.

One of the first to claim that he had solved this ancient puzzle was Prof. Miethe, who, in 1924, announced the result of experiments with a mercury vapor lamp, similar to that giving the violet light often used in photographic and movie studies, and in which an electric arc operates in a vapor of mercury. He was assisted in this work by Dr. H. Stammreich, and in one series of experiments the lamp was operated for 197 hours with an electrical force of about 160 volts at 12.6 amperes, a current of about the same order as that used in lighting our homes. Though the mercury was shown free from gold at the beginning, slight traces of yellow metal, less than three ten-millionths of an ounce, were found at the end. Miethe as such an amount is, delicate chemical tests can detect it, and the tests in this case were made by Dr. Fritz Haber, considered one of the greatest of German chemists. In later experiments, Dr. Miethe claimed that he had obtained the gold in much larger quantities; enough to test by the ordinary laboratory methods, but not enough to make the method commercially practicable.

According to modern conceptions, the atoms of which all matter is made consist of a nucleus made up of what are called protons, around which revolve a number of electrons, much as the planets revolve around the sun. The outer electrons, in fact, are referred to as "planetary electrons". The difference between elements, according to this theory, is due only to the electrical charge of the nucleus and the number and arrangement of the planets. In the case of elements like radium, the atoms break apart spontaneously with the liberation of helium, whose atom is the simplest known next to hydrogen.

Theoretically then, it seems easy to change the atoms, by merely knocking out some of the planets, but this does not affect the nucleus. Dr. R. A. Millikan, of

the California Institute of Technology, has thus obtained what he calls "stripped atoms" of some elements, in which the outer ring of planets has been removed, but this does not radically alter the elements.

To break into the nucleus, the central "sun" of the atomic solar system, would require, in the opinion of many scientists, vast amounts of energy. Since mercury is next to gold in the procession of the elements, the removal of a single charge, corresponding to the complete nucleus of hydrogen, which is the simplest of the elements, would convert mercury to gold. But the nuclei of other elements have been bombarded with an energy corresponding to five million volts, with no sign of disintegration.

Now it seems, however, that comparatively small amounts of energy are able to get in where larger amounts have failed, and the work at Amsterdam is taken as confirming the atomic theories. The method of the Dutch scientists, however, was slightly different from that used by Miethe and Nagaoka, for instead of mercury they used lead, its close relative. The lead was melted and the tube filled with its vapor. Though the lead was free from mercury, as demonstrated by the fact that spectral photographs of the light from the tube showed only the lead spectrum, after a current of 60 to 100 amperes had been passed through it in the form of successive sparks for a time, the lead spectrum gradually began to disappear. Instead of the lines indicating this element, those of mercury gradually appeared on the plate, together with those of thallium, a rather rare metal which lies between lead and mercury in the list of the elements.

Though the lead spectrum almost completely disappeared, "this does not prove the transmutation to be strong," Prof. Smits reports, "as it is known that a small quantity of mercury can cause the spectrum of another element to disappear. But at all events our spectra show in a very convincing way the transmutation of lead into mercury."

The presence of this synthetic mercury was confirmed by a chemical test, for when iodine vapor was passed through the tube containing the product of twelve hours of sparking, the familiar red color of mercury iodide appeared.

PLEDGE SUPPORT TO RESEARCH TO FORESTALL NEEDLESS SUFFERING

Prominent public men and leading scientists have pledged themselves to see to it that the United States shall give proper support and encouragement to pure science research, it was announced recently by the trustees of the National Research Endowment.

"It is wiser to make large expenditures for scientific research, thus advancing civilization, improving human welfare, conserving health, and saving countless lives, than to tolerate unnecessary suffering and then endeavor to alleviate it at still greater cost," said the announcement.

Research in all branches of the mathematical, physical and biological sciences should be encouraged not alone for its material value but because of the intellectual and spiritual value of adding to knowledge, it is contended.

What may appear to be useless abstract discoveries often result in the greatest advances in science and in industry, and for this reason, among others, the trustees announced their intention of securing adequate funds for the encouragement of research in pure science.

Contrary to the opinion generally held, the United States, although leading in industrial research, lags in research in pure science and supports such research on a level far below what its population, education, and material resources demand. There is, this body contends, an overcrowding of educational institutions that has reduced the limited opportunities for pure science research.

The endowment funds to be raised by the trustees will be administered by the National Academy of Sciences, the leading scientific organization that is by Congressional charter the scientific adviser of the government. Among the trustees of the National Research Endowment are: Secretary Hoover, Dr. A. A. Michelson, Gano Dunn, Elihu Root, Col. Edward M. House, C. P. Forbes, Henry S. Pritchett, Dr. Robert A. Millikan, Dr. John C. Merriam, Owen D. Young, Dr. Simon Flexner, Dr. John J. Carty, Dr. William H. Welch, Prof. A. E. Lamb, Prof. Oswald Tebken, Dr. Thomas H. Morgan, Dr. George E. Hale, Dr. Vernon Kellogg, Andrew W. Mellon, Charles E. Hughes, Henry M. Robinson, John W. Davis, Julius Rosenwald, Dr. James H. Breasted, Felix Warburg, Prof. L. R. Jones.

LARGE SUNSPOTS INDICATE GREAT SOLAR ACTIVITY

The large sunspot observed by many astronomers, both amateur and professional, during January, and visible even to the unaided eye through smoked glass, disappeared on January 31, when the sun's rotation carried it around the western edge. There is good reason for supposing that it will be seen again, however. Since the time it was first seen last November, this large spot has crossed the solar disc three times. Large spots usually survive for several months and sometimes as long as a year. Dr. Frederick Slocum, professor of astronomy at Wesleyan University, told a representative of Science Service.

Prof. Slocum has been studying the sun and its activities at the Van Vleck Observatory of Wesleyan University since 1914, when he became director, and before that he made a specialty of solar studies at the Yerkes Observatory of the University of Chicago.

As the sun rotates on its axis once in about 25 to 38 days, a spot is carried across the disc from east to west, but the rotation is not uniform for all parts of the sun. Spots on the solar equator cross the disc most rapidly, indicating that for that part of the sun the rotation period is about 25 days, while near the poles of the sun the rotation is much slower.

"The large spot recently visible on the sun crossed the central meridian when it was nearest the center of the disc, as seen from the earth, on December 1, December 28, and January 24," said Prof. Slocum. "It was on the eastern edge of the sun on January 17, and having crossed the disc, it passed around the west edge on January 31. This spot is in latitude 22 degrees north on the sun, and the group is 150,000 miles long; the umbra, or dark center, of the main spot being 20,000 miles in diameter, easily visible to the naked eye with smoked glass. Large spots usually last two or three months and occasionally over a year, but smaller spots may last only a few days.

Prominences, the red flames of hydrogen, which shoot out from the sun and are seen at the time of total eclipses of the sun, and at other times with the proper instruments, are related to the spots. When a spot is on the edge, the prominence is soon above it, but Prof. Slocum does not believe that the large spot is related to the prominences observed by the Swarthmore College expedition to Sumatra during the eclipse on January 14. There was, however, a smaller group of spots in 20 degrees south latitude at the edge of the sun on January 14, and these may have caused some of the eclipse prominences.

"The last sun spot maximum occurred in July, 1917," Said Prof. Slocum, "so if the period is the normal eleven years, the next should occur in 1928. Recent sun spot activity, however, indicates that there will be either an earlier maximum or one of greater intensity than usual."

OLD CHINESE DRUG IS NEW MEDICAL FIND

An ancient Chinese remedy, esteemed in the east for 5,000 years, promises to become a powerful new tool in the hands of modern doctors. When introduced into laboratories of the University of Wisconsin by Dr. K. K. Chen, the drug stood stiff tests as a treatment for asthma and colds in the head, and also as a local anesthetic.

The drug which is being studied by Dr. Chen is known as ephedrine and is the active principle of a lowly herb.

"The plant has long been used by the Chinese as a treatment for asthma," said Dr. Chen in an interview. "It is characterized by the sweating which follows its use."

Used in asthma, ephedrine forces the muscles to relax around the air passages in the lungs. The effective area of the lungs is thereby increased and breathing becomes easier. Its use in a head cold is to close the ducts of the secreting glands, thus relieving the condition known as a running nose.

Because tests indicate that it is more powerful and more perfect, ephedrine is expected to supplant adrenalin, which is obtained from the adrenal glands of animals and put to a variety of clinical purposes.

"The most important property of the purified drug is its ability to raise the blood pressure over long periods. In this respect it is superior to adrenalin, which causes only a temporary rise," said Dr. Chen.

The increase in blood pressure which takes place is due in part to the constriction of the minute blood vessels, and to this power is due the efficacy as a local anesthetic. Ephedrine temporarily shrinks the walls of the capillaries - the tiny vessels joining the arteries with the veins. The blood supply is restricted and the area treated becomes insensitive to pain.

With adrenalin, constriction of the blood vessels is followed by dilation, that is, a fall in blood pressure; but ephedrine, the new drug, causes only prolonged constriction without the ensuing opposite effect.

Other uses for which ephedrine may replace adrenalin, it is anticipated, are to arrest bleeding in hemorrhage in difficult cases, and to maintain the circulation following excessive loss of blood.

The chemical formula for ephedrine and its pharmacological effects on lower animals have been known for decades, but its wide clinical scope was not shown until Dr. Chen tried the drug on animals and studied it clinically. This was done first at Pekin, and now at the University of Wisconsin under the direction of Dr. A. S. Loevenhart and Dr. W. J. Meek.

RUSSIA TO HAVE LARGEST REFRACTING TELESCOPE

Not much longer will the United States have the honor of having the largest refracting telescope in the world within its borders, for the new telescope of the Russian Central Observatory . . . will have a lens 41 inches in diameter. This will be an inch larger than the 40 inch telescope of the Yerkes Observatory of the University of Chicago, the supremacy of which has been disputed for the last 30 years. However, the United States will still have the largest telescope, for the 100 inch reflector of the Mt. Wilson Observatory, using a concave mirror to form the image instead of a lens, is still unsurpassed in size.

In a statement to Science Service, Dr. A. Ivanoff, director of the observatory, stated, "The order for this telescope was made in 1912 by the Russian Government to the firm of Grubb, in Dublin, but the circumstances of the war and the following events in Russia delayed its execution. In 1922 the Soviet Government renewed the order. According to the original plan, the instrument was to have a photographic lens 32 inches in diameter, with a focal length of 35 feet.

"The mechanical parts were finished by the Grubb firm before its liquidation but the attempts to get the necessary glass discs for the lens met with considerable difficulty. The Parsons firm at Newcastle, however, finally succeeded in preparing the glass for a lens 41 inches in diameter, so the original plan was changed. It was decided to build a photographic telescope with the lens this size, but with the original focal length of 35 feet, and so the instrument was completed by Parsons. It has been set up in England, for testing but it will be taken to Simeis, on the southern coast of Crimea, 60 kilometers east of Sevastopol, where the observatory and dome have already been completed. At Simeis is a branch of the Pulkovo Observatory, and it is noted for its excellent atmospheric conditions. At the present time the installation of a reflecting telescope of 40 inches diameter is almost completed."

As the 41 inch telescope will have a photographic lens it will not be adapted for visual observations, as is the 40 inch of the Yerkes Observatory. In this respect it will be similar to the 30 inch refractor of the Allegheny Observatory at Pittsburgh. At the Potsdam observatory in Germany is a photographic telescope with a lens 32 inches in diameter, and attached to it is a visual telescope of 20 inches aperture. A visual telescope can be used to take photographs by the use of a yellow filter which cuts out the blue light that such a lens does not focus sharply. But this lengthens the exposure, necessary, and a specially designed photographic lens has many advantages. Because its focal length is so

short, only 35 feet as compared with 75 feet for the 40 inch at Yerkes, the 41 inch telescope will have tremendous light gathering power and will be especially useful in the study of faint nebulae and other such objects.

This will not be the first time that Russia has had the largest telescope, for the first of the modern telescopes, built about a century ago for the observatory at Dorpat, which then was in Russia, had the then unprecedented size of nine and a half inches. The 30 inch refractor, still in use at Pulkovo, when finished in 1885 was the world's largest telescope also. The lens for this one was made in the United States by Alvan Clark, in Massachusetts. Before it was completed, the 26 inch telescope of the Naval Observatory in Washington completed in 1874 held the world's record, while after it the 35 inch at the Lick Observatory held the honors, only to have them taken away by the 40 inch Yerkes telescope, located at Williams Bay, Wis.

SAME FROG BOTH MALE AND FEMALE

A big bullfrog that is both male and female is the unusual animal reported by Mrs. W. D. Hammontree, teacher of biology at Tennessee Wesleyan College.

"After removing a large handful of eggs from this frog, it was discovered that the animal is hermaphroditic," Mrs. Hammontree states. "There is a perfectly developed set of male organs and also perfectly developed female organs."

Many of the lower animal groups are both male and female. The common earthworm is practically always bisexual, though it does not function as male and female at the same time. Among the higher animals female organs are sometimes found in males, and vice versa; but in these cases such traces are usually not normally developed. Fully developed bisexual conditions in a higher animal, such as this frog, are very uncommon.

EVOLUTION UNMOLESTED AT NEBRASKA UNIVERSITY

Evolutionary teaching in Nebraska is free and unmolested, reports to the contrary notwithstanding, according to Prof. Franklin D. Barker of the University of Nebraska, writing in a recent issue of "Science". Prof. Barker takes issue with a statement made by Dr. Henry Fairfield Osborn of the American Museum of Natural History, to the effect that on a recent trip in Nebraska he learned that "even in the state university there was a 'hush' at the word."

"The departments of botany, geology, sociology and zoology," says Prof. Barker, "teach evolution with the utmost freedom. The department of zoology teaches evolution in every course and offers a special course each semester to a large group of students under the specific title of "Evolution."

RATS THRIVE ON ALCOHOL RATION

The age old question as to whether use of alcohol affects growth is being investigated by experiments on rats, conducted by Dr. Curt P. Richter at the Johns Hopkins Hospital. The animals tested took in an 8 to 16 per cent. solution of alcohol as a steady ration, without becoming intoxicated or habituated to alcohol. They ate less food, but they grew just as fast as prohibitionist rats in the same laboratory that drank pure water.

The amounts of alcohol digested by the rats were much greater in proportion to body weight than a man could take aboard and still function normally. This is explained on the grounds that rats have a more active existence than men and so have greater energy requirements.

Dr. Richter found that when the doses were continued over long periods of time, the rats which took alcohol ate 17 to 36 per cent. less than the animals which drank water. In spite of the fact that they ate so much less, they grew just as rapidly and reached the same body weight at maturity as the water drinkers.

Other research has shown that humans, given one-fifth to one-seventh the dose Dr. Richter's rats received on the basis of body weight, also utilized the alcohol and took correspondingly less food. The smaller dose in the case of man allows for the lower demand for calory-producing food, due to a less active existence.

Dr. Richter's experiments are part of a larger series undertaken primarily for the purpose of investigating the factors involved in the production and modification of activity in animals and man. While they indicate that the alcohol replaces an equivalent quantity of food, the results on the intelligence may be different, it is pointed out.

TO ENCIRCLE CITIES WITH NATIONAL FORESTS

Ten million acres of national forests in ten years encircling the great cities and industrial regions of the United States, is the ambitious program which received the endorsement of the second annual National Conference on Outdoor Recreation meeting in Washington recently.

The program calls for the acquisition of two and one-half million acres in the Great Lakes region, from three to four million acres in the region of the White Mountains and the Appalachians, and two and one-half million acres of the remaining pine forests in the South. It is expected that these great zones of wilderness will not only provide breathing-places for the dense population of the great commercial and industrial centers but will more than pay for themselves under a policy of scientific forest management. The toleration of destructive unregulated grazing of stock in national forests was opposed by the Conference.

The Conference also placed itself on record as favoring the proposed extension of the Yellowstone National Park to include the headwaters of the Yellowstone River and the Teton mountain range, and boundary adjustments of Rocky Mountain,

Grand Canyon, Sequoia and Mount Rainier national parks. It also backed the Game Refuge Bill, and endorsed the policy of federal aid for highways.

The National Conference on Outdoor Recreation was called into being by President Coolidge in 1924, as a means of coordinating the activities of the numerous organizations interested in various aspects of outdoor life in America. In addition to official delegates of the Federal and State governments about one hundred independent organizations were represented at the meeting.

INDIAN TRIBES SEEK INDEPENDENCE

The "Six Nations" of Indian tribes, famous in history as the allies of the French in the French and Indian War which preceded the American Revolution, is one of the latest of small nationalities to claim recognition as an independent nation. They base this claim on a treaty signed many years ago by King George III of England which guaranteed them this right, and their council, held recently at Sour Springs, near Brantford, Ontario, was in the nature of a test case of Indian autonomy, according to Prof. F. G. Speck, professor of anthropology at the University of Pennsylvania, who attended the meeting.

According to Prof. Speck, the purpose of the council was to inaugurate the successors of two governing sachems of the confederation who recently died, and to perform the ceremony of condolence on the death of the two chiefs. One was Deskaheh, a prominent figure in the renaissance of Iroquois independence, and who represented the council at the League of Nations, so that the choice of his successor was an important one to the Indian nationalists.

"The council gathered in the old 'Long House' at Sour Springs," said Prof. Speck, "and packed it to capacity. Always with strict regard for the formal procedure of their ancestors, the dignity of this occasion was rendered still more pronounced because it was a crucial one in their history."

"The condolence ceremony opened," Prof. Speck continued, "when representatives of the three brother tribes, the Mohawks, Onandagas and Senecas, met to sing the ceremony of the approach to the bonfire, after which a song of condolence was sung and words of consolation were delivered by the Mohawk chief Dah-ek-kah and a string of wampum passed around. After further rites, including six more condolence songs, chief Abram Charles, of the Cayugas, offered the final acceptance address, and requested the privilege of presenting the successors of the dead chiefs.

"Mrs. Louise Miller, the chief matron of the Cayugas, then led forth Alexander General as the successor of Deskaheh; and the second successor, James Johnson, was led forth by another Cayuga matron as the one to assume the title of Deh-yoh-doh-weh-kon. Representatives of the bereaved tribes were then formally asked if the successors were acceptable to them and after deliberation Ho-noh-we-yoh-don voiced their approval and acceptance, concluding the formal rites of the inauguration.

"After this, the parties, arranged on either side of the fire, were asked if any had any interesting dreams to recite, to which invitation several responded. Lest the psychoanalyst be startled by this statement, I might say that reference to dreams among the Six Nation Indians means 'important news'!"

DETERMINE SEX BY BLOOD TESTS

A simple chemical test by which sex can be determined with reasonable accuracy has been developed by Dr. Dewey G. Steele, and Dr. Agnes Zeinert, working at the University of Wisconsin. The blood test has been applied to cattle and birds, and it works also on human beings.

In an accuracy trial, 20 pigeons were placed in the proper category out of 20 tried; of 77 fowl, 63 were ranked with the correct sex; and with 17 cattle there were no errors. The test is doubly sure with **poultry**, as the feathers have been found to give an additional, but reversed reaction.

"Using this criterion of sex, poultrymen can kill off the useless males early in life," Dr. Steele said. While emphasizing that the technic is still in the laboratory stage, Dr. Steele indicated that the test might be of use in criminology and in showing the sex of unborn children.

The test may also be of use to biologists, in order to reveal body changes following the transplantation of male sex glands.

The procedure in the case of cattle consists in adding hydrochloric acid and an oxidizing solution to a test tube sample of serum, diluted 100 times, of the animals to be examined. Four drops of methyl green dye are then introduced, whereupon serum taken from females gives a green color, and that originating in males, a red.

The explanation of the reaction is a difference in the appetite for oxygen of the serum from males and females, in Dr. Steele's opinion.

"A cumbersome test, requiring 5 chemicals and complicated by a time factor, is being used in Russia with some success to forecast sex in pregnancy," the biochemist states.

INTELLIGENCE IS MINOR FACTOR IN MONEY MAKING

If you set out in this world to make money, your success will depend more on your personality than on intelligence or ability as a scholar. And a sense of humor won't help you so very much, either.

What you will need to stock up on are the traits usually displayed in abundance by self-made men of so many "success" stories: aggressiveness, enthusiasm, accuracy in work, and self-reliance.

A study of the mathematical relation between personality and income has just been made at Purdue University, and the traits that go hand in hand with money making are listed in order of their importance. Typical college men, who were graduated from engineering school five years ago, were taken as subjects for the study.

Originality and address are of more monetary importance in personality than neatness and sincerity, the investigation indicates. Reasoning ability stands twelfth in the series of 23 personal traits correlated with income. Moral

habits are the last thing in personality makeup that has any connection with financial success.

DIABETES INSIPIDUS CAUSE BELIEVED FOUND

A cure for diabetes insipidus, a disease which is characterized by the excessive elimination of water by the system, may soon be won by medical science.

The first step toward this end has been made by Dr. Helen Bourquin, professor of physiology at the University of South Dakota, who has duplicated in animals all the symptoms of the disease as they are exhibited by afflicted humans.

Application of electric cautery to the pituitary - a small gland in the head - was the procedure which resulted in experimental diabetes insipidus in dogs.

The discovery appears to have revealed the mechanism which regulates the amount of water in the body. "The operation leads to actual drying up of the animals, if the water intake is restricted," Dr. Bourquin stated.

"The disease appears to be due to the discharge into the blood of something which stimulates the kidneys powerfully."

TABLOID BOOK REVIEW

THE WAYS OF LIFE. By Richard Swan Lull. New York: Harper and Brothers, 1925. \$3.00.

The current struggle in public opinion over the question of organic evolution has resulted in the production of many new volumes on the development of life. A large part of these are either very hastily gotten up by more or less recognized authorities, who doubtless already regret some of the things they have put into print, and others are the product of obscurer and ill-prepared folk who are impelled either by fanaticism or a desire to ride the wave to notoriety or profit. But better digested and better prepared books are now beginning to appear, and of these Doctor Lull's must be counted one of the foremost. As might be expected, he gives a great deal of space to the paleontological record, yet his treatment of the other lines of evidence, though briefer, is still adequate. And anyway, to most of us the most interesting thing about evolution is the paleontological part. A very valuable chapter is the second, on the "Plasticity of Living Matter": too many of our modern popular science books neglect this fundamental physiological aspect, which is really the key to the whole situation.

The death rate from communicable diseases is much higher in babies under two years than in older individuals.